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Société Anonyme known as : L'Oréal

Oxidizing compositions containing a mixture of polymers including at least one copolymer based on acrylamide and 2-acrylamido-2-methylpropanesulphonic acid

Inventors :

**Oxidizing compositions containing a mixture of polymers
including at least one copolymer based on acrylamide and 2-
acrylamido-2-methylpropanesulphonic acid**

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The present invention relates to oxidizing compositions for treating keratin materials, comprising a mixture of polymers including at least one copolymer based on 2-acrylamido-2-methylpropanesulphonic acid and acrylamide, and to their uses for dyeing, for permanently reshaping or for bleaching or stripping human keratin fibres and in particular the hair.

It is known practice to bleach keratin fibres and in particular human hair with bleaching compositions containing one or more oxidizing agents. Among the oxidizing agents conventionally used, mention may be made of hydrogen peroxide or compounds capable of producing hydrogen peroxide by hydrolysis, such as urea peroxide or persalts, for instance perborates, percarbonates and persulphates, hydrogen peroxide being particularly preferred.

These bleaching compositions are generally in the form of anhydrous products (powders or creams) containing alkali compounds (amines and alkali silicates) and a peroxygenated reagent such as an ammonium or alkali metal persulphate, perborate or percarbonate, which is diluted at the time of use with an aqueous hydrogen peroxide composition.

Bleaching compositions may also result from the mixing, at the time of use, of the anhydrous peroxygenated reactive powder with an aqueous composition containing the alkali compounds and another aqueous composition containing the hydrogen peroxide.

It is moreover known practice to dye keratin fibres and in particular human hair with dye compositions containing oxidation dye precursors, in particular ortho- or para-phenylenediamines, ortho- or para-aminophenols, and heterocyclic compounds, generally known as
5 oxidation bases. Oxidation dye precursors, or oxidation bases, are colourless or weakly coloured compounds which, when combined with oxidizing products, may give rise to coloured compounds or dyes via a process of oxidative condensation. It is also known that the shades obtained with these oxidation bases may be varied by combining them
10 with couplers or coloration modifiers, the latter being chosen especially from aromatic meta-diamines, meta-aminophenols, meta-diphenols and certain heterocyclic compounds such as indole compounds.

To localize the bleaching or dyeing product on the hair so that
15 it does not run onto the face or beyond the areas that it is proposed to bleach, use has been made hitherto of conventional thickeners such as crosslinked polyacrylic acid, hydroxyethylcelluloses, certain polyurethanes, waxes, and also, in the case of aqueous bleaching compositions, mixtures of ionic surfactants with HLB (hydrophilic
20 lipophilic balance) values which, when suitably selected, give rise to the gelling effect when they are diluted using water and/or surfactants.

More recently, the use of amphiphilic polymers comprising at least one ethylenically unsaturated monomer containing a sulphonic group and more particularly acrylamido-2-methylpropanesulphonic
25 acid polymers or copolymers, which form the subject of the patent application FR 2 818 537, to obtain hydrogen peroxide solutions that are thickened or in gel form and stable on storage, has been discovered.

However, the formulations thus thickened, or gelled, cause a problem of use during the mixing of the oxidizing agent with a dye support. Indeed, very substantial fluidizing of the two formulations takes place as soon as the mixing is begun. Even though this fluidizing phase is only transient, the use of these oxidizing formulations is
5 problematic, most particularly for professionals.

The Applicant has discovered, surprisingly, that it is possible to very greatly reduce this fluidizing observed during mixing, by combining at least one copolymer based on acrylamide and 2-
10 acrylamido-2-methylpropanesulphonic acid with oxidizing formulations containing at least one polymer having at least one particular sequence of 2-acrylamido-2-methylpropanesulphonic acid units. The Applicant has thus obtained thickened oxidizing compositions, which are stable on storage, irrespective of the source
15 of aqueous hydrogen peroxide solution used, eliminating the problems of fluidizing, in particular in the case of mixing.

The invention also relates to processes for the oxidation dyeing of keratin fibres, to processes for treating the said fibres, and in particular permanent-waving processes, to bleaching or stripping
20 processes, and also to multi-compartment dyeing devices or "kits".

Other characteristics, aspects, subjects and advantages of the invention featured in the description below will allow the invention to be defined more clearly.

For the purposes of the present invention, the term "stripping"
25 means the total or partial destruction of the pigments or synthetic dyes present on or in keratin fibres resulting from a direct dyeing or oxidation dyeing process.

For the purposes of the present invention, the term "bleaching" means the total or partial destruction of the natural pigments present in keratin fibres (in particular eumelanins and phaeomelanins).

One subject of the present invention is thus an oxidizing
5 composition for keratin fibres, in particular for human keratin fibres and more particularly the hair, comprising, in a cosmetically acceptable medium:

(a) at least one oxidizing agent chosen from the group formed by hydrogen peroxide and compounds capable of producing hydrogen
10 peroxide by hydrolysis, or mixtures thereof,

(b) at least one copolymer based on 2-acrylamido-2-methylpropanesulphonic acid and acrylamide, and

(c) at least one polymer chosen from crosslinked 2-acrylamido-2-methylpropanesulphonic acid homopolymers or amphiphilic copolymers
15 consisting of at least one sequence of 2-acrylamido-2-methylpropanesulphonic acid units and at least one unit comprising a hydrophobic portion.

For the purposes of the present invention, the term "hydrophobic portion" means a branched or non-branched, saturated or unsaturated
20 hydrocarbon-based fatty chain containing from 6 to 50 carbon atoms.

The polymers contained in the composition in accordance with the invention are in free form or are partially or totally neutralized with a mineral base (sodium hydroxyl, potassium hydroxyl or aqueous ammonia) or an organic base such as monoethanolamine, diethanolamine
25 or triethanolamine, an aminomethylpropanediol, N-methylglucamine, basic amino acids, such as arginine and lysine, and mixtures of these compounds.

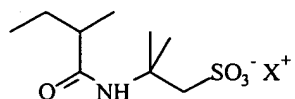
The copolymer (b) is formed from 2-acrylamido-2-methylpropanesulphonic acid and acrylamide. Commercial products that

may be mentioned include the products sold in the form of an inverse emulsion under the references Sepigel 30J or Simulgel 600 by the company SEPPIC.

The polymers (c) contain at least one sequence of 2-acrylamido-2-methylpropanesulphonic acid units. Thus, when these polymers do not consist only of this sequence, they are poly(2-acrylamido-2-methylpropanesulphonic acid) homopolymers. The passage in patent FR 2 753 372 devoted to the description of these homopolymers is incorporated into the present patent application.

According to the invention, the poly(2-acrylamido-2-methylpropanesulphonic acid) polymers are crosslinked, preferably with trimethylolpropane triacrylate and comprise, randomly distributed:

- from 90% to 99.9% by weight of units of general formula (1) below:



(1)

in which X^+ denotes a cation, preferably the ammonium ion, or a mixture of cations, not more than 10 mol% of the cations possibly being protons H^+ ;

- from 0.01% to 10% by weight of crosslinking units derived from at least one monomer containing at least two olefinic double bonds; the weight proportions being defined relative to the total weight of the polymer.

The crosslinked poly(2-acrylamido-2-methylpropanesulphonic acid) homopolymer preferably comprises a number of units of formula (1) that is large enough to obtain polymer particles whose hydrodynamic volume in a water solution has a ratio ranging from 10 to 500 nm and whose distribution is uniform and unimodal.

The crosslinked poly(2-acrylamido-2-methylpropanesulphonic acid) polymers are present in the cosmetic compositions of the invention in concentrations ranging from 0.01% to 10% and more particularly from 0.05% to 5% by weight relative to the total weight of the composition.

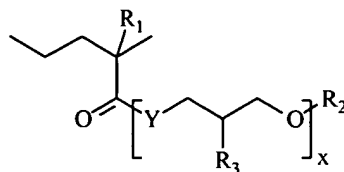
5 When the polymers (c) contain more than one sequence of 2-acrylamido-2-methylpropanesulphonic acid units, the copolymer is chosen from amphiphilic copolymers consisting of at least one sequence of 2-acrylamido-2-methylpropanesulphonic acid units, and of at least one unit comprising a hydrophobic portion. These amphiphilic polymers
10 are described in patent application FR 2 818 540. The passage of this patent application devoted to the description of these amphiphilic polymers is incorporated into the present patent application.

 The amphiphilic copolymers have a weight-average molecular weight ranging from 20 000 to 10 000 000, preferably from 50 000 to
15 8 000 000 and more particularly from 100 000 to 7 000 000.

 These copolymers may be crosslinked. When they are, the crosslinking agents may be chosen from the polyolefinically unsaturated compounds commonly used for crosslinking polymers obtained by free-radical polymerization. These agents are preferably chosen from
20 methylenebisacrylamide, allyl methacrylate and trimethylolpropane triacrylate (TMPTA). The degree of crosslinking preferably ranges from 0.01 to 10 mol% and more particularly from 0.2 to 2 mol% relative to the polymer.

 The amphiphilic copolymers comprise at least one sequence of an
25 ethylenically unsaturated hydrophobic monomer comprising at least one hydrophobic portion ranging from 6 to 50 carbon atoms, preferably from 6 to 22 and more particularly from 12 to 18 carbon atoms.

 This ethylenically unsaturated hydrophobic monomer is chosen from the acrylates or acrylamides of formula (2) below:



(2)

5 in which R_1 and R_3 , which may be identical or different, denote a hydrogen atom or a linear or branched C_1 - C_6 alkyl radical, preferably methyl; Y denotes O or NH; R_2 denotes a hydrophobic hydrocarbon-based radical containing from 6 to 50 carbon atoms, more preferably from 6 to 22 carbon atoms and even more preferably from 6 to 18 carbon atoms; x denotes a number of moles of alkylene and ranges from
10 0 to 100.

 The amphiphilic polymers described above are present in concentrations ranging from 0.01% to 30% by weight, more preferably from 0.1% to 10% by weight and even more preferably from 0.5% to 2%
15 by weight relative to the total weight of the composition.

 Another subject of the invention is a process for the oxidation dyeing of human keratin fibres and in particular the hair using a dye composition comprising, in a support that is suitable for dyeing keratin
20 fibres, at least one oxidation dye precursor and an oxidizing composition as defined above. At the time of use, the dye composition is mixed with the oxidizing composition described; the mixture obtained is then applied to the keratin fibres and left to act for 3 to 50 minutes approximately and preferably 5 to 30 minutes approximately, followed
25 by a step of rinsing, washing with shampoo, rinsing again and finally drying. The dye composition and the oxidizing composition described

may be applied sequentially, and in any order, with or without intermediate rinsing.

Another subject of the present invention is a process for treating
5 human keratin fibres and in particular the hair, in order to permanently
reshape these fibres, in particular in the form of permanent-waved hair,
this process comprising the following steps.

A reducing composition is applied to the keratin material to be
treated, the keratin fibre being placed under mechanical tension before,
10 during or after the said application. This is performed lock by lock or to
all the keratin fibres.

The head of hair onto which the reducing composition has been
applied should conventionally be left at rest for a few minutes, generally
5 minutes to one hour. The reducing agent thus has time to act on the
15 hair. This waiting phase preferably takes place at a temperature ranging
from 35°C to 45°C, preferably also while protecting the hair with a
hood.

The keratin fibre impregnated with the reducing composition is
optionally rinsed with an aqueous composition.

20 The oxidizing composition of the invention is applied to the
optionally rinsed keratin fibre, in order to fix the new shape given to the
hair. Again, the treated head of hair is left at rest for 3 to 30 minutes
and preferably between 5 and 15 minutes.

The keratin fibre again undergoes a rinsing operation, generally
25 with water.

The oxidizing composition according to the invention may also
be used in a process for bleaching or stripping human keratin fibres and
in particular the hair, comprising the following steps: application of the

oxidizing composition according to the invention to the keratin fibre, followed by a step of rinsing the keratin fibre thus treated.

Another subject of the invention is a 2-compartment device for dyeing or permanently reshaping or bleaching keratin fibres, in particular human keratin fibres. A first compartment contains either a dye composition or a reducing composition or a first oxidizing composition, and a second compartment contains the oxidizing composition defined above.

In the context of bleaching, the first composition is preferably an anhydrous powder or paste containing at least one persalt.

The examples that follow illustrate the invention without being limiting in nature.

Example 1

The Applicant performed a comparative test in order to demonstrate the improvement provided in terms of fluidizing during the mixing of the oxidizing composition and the dye composition.

The Applicant prepared 3 compositions, 2 in accordance with the prior art and 1 in accordance with the invention (table below).

	Formula A in accordance with the prior art	Formula B in accordance with the prior art	Formula C in accordance with the invention
Aqueous hydrogen peroxide solution	6%	6%	6%
Crosslinked polyacrylamidomethylpropanesulphonic acid partially neutralized to 50% with aqueous	1.5%	/	1.5%

ammonium, sold by Clariant under the name Hostacerin AMPS			
Acrylamide/acrylamidomethylpropanesulphonic copolymer, sodium salt, as an inverse emulsion in isohexadecane/water, sold by SEPPIC under the name Simulgel 600	/	1%	1%
pH agent	qs pH=3.6	qs pH=3.6	qs pH=3.6
Water	qs 100g	qs 100g	qs 100g

The stability of these oxidizing gels was studied over time. This assessment was performed by a panel of 5 experts.

5 The composition of formula B is unstable. Indeed, it shows a drop in viscosity after 2 months at 45°C. On the other hand, the compositions of formulae A and C remain stable.

The dye support used to prepare the mixtures is the commercial support Excellence shade 5 from the company L'Oréal. The fluidizing was evaluated by a panel of 5 experts.

10 The compositions of formulae A and B show substantial fluidizing as soon as the mixing is begun.

The composition of formula C has no significant observed fluidizing.

15 These comparative tests clearly show the superior effect of the combination of the two polymers, compared with the compositions comprising only one polymer.

20 Example 2

Similarly, when an amphiphilic copolymer according to the invention is combined with the 2-acrylamido-2-

methylpropanesulphonic acid polymer according to formula D, no fluidizing is observed during the mixing with the commercial dye support Excellence shade 5 sold by the company L'Oréal. This study was evaluated by a panel of 5 experts.

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	Formula D in accordance with the invention
Aqueous hydrogen peroxide solution	6%
Sodium stannate	0.04%
Sodium pyrophosphate	0.03%
Isostearyl alcohol	2%
80/20 AMPS/ethoxylated(25 EO)cetearyl copolymer, crosslinked with trimethylolpropane triacrylate (TMPTA) sold by Clariant under the name Aristoflex HMS	1%
Acrylamide/acrylamidomethylpropanesulphonic copolymer, sodium salt, as an inverse emulsion in isohexadecane/water, sold by SEPPIC under the name Simulgel 600	1%
pH agent	qs pH=3.5
Water	qs 100g